

## REMARKS

### (I) Rejection of the claims under 35 U.S.C. 102(a) over WO 03055840

In the outstanding Office Action, claims 1-34 and 38 are rejected under 35 U.S.C. 102(a) as being anticipated by WO 03055840, which was published on July 10, 2003. In connection with rejection, the Examiner states as follows:

"It is not readily apparent whether applicant's priority documents support the claims, and thus whether the patent family members actually antedate the filing dates of the priority documents. Clarification is required." (see page 2 of the Office Action).

However, the Applicants' previous response filed on July 3, 2008 already shows that the claims of the present application are supported by the priority documents, i.e., Japanese Patent Application Nos. 2003-185077 and 2003-185078, the Examiner confirmed each of which has a filing date of June 27, 2003. In order to discuss the matter, the Applicants' attorney conducted an interview with the Examiner on December 3, 2008. In the interview, the Examiner confirmed that she had failed to consider the Applicants' argument, and suggested that the Applicants simply reiterate the text bridging pages 2 and 3 of the July 3, 2008 response. Following the Examiner's suggestion, the argument made at page 2, line 7 from bottom to page 3, line 5 from bottom of the Applicants' July 3, 2008 response is reiterated below.

The claims of the present application are fully supported by the priority documents. For example, claims 1 and 38, the independent claims, are supported by the priority documents, as explained below.

With respect to claim 1, this claim is supported, for example, by the first priority document, i.e., Japanese Patent Application No. 2003-185077. Specifically, steps (1) to (4) of the method of claim 1 are described at page 1 of the English translation of the first priority document. With respect to performing steps (3) and (4) "in either order, or partially or wholly simultaneously", this is apparent from the entire text of the first priority document, which teaches that steps (3) and (4) can be performed independently of each other.

With respect to claim 38, this claim is also supported, for example, by the first priority document, i.e., Japanese Patent Application No. 2003-185077. Specifically, steps (1) to (5) of the method of claim 38 are taught from the descriptions of pages 1 and 24-26 (especially the formulae appearing at pages 25-26) of the English translation of the first priority document. Also, the recycling of the organometal compound formed in step (3) to step (1) is taught from the description of page 45, lines 6-10 of the English translation. Further, the recycling of the alcohol obtained in step (4) to step (3), and the recycling of the dialkyl carbonate obtained in step (5) to step (4), are apparent from the following description of the first priority document:

"The present inventors have made extensive and intensive studies with a view toward solving the above-mentioned problems. As a result, it has been found that an organometal compound can be regenerated by a process in which an organometal compound, carbon dioxide and optionally an alcohol are reacted with one another to obtain a reaction mixture containing a dialkyl carbonate, the dialkyl carbonate is separated from the reaction mixture to obtain a residual liquid comprised mainly of an organometal compound, the residual liquid is reacted with an alcohol, and water produced by the reaction between the residual liquid and the alcohol is removed by distillation or the like. Further, it has also been found that, by performing a transesterification reaction between the dialkyl carbonate and an aromatic hydroxy compound to obtain an alkyl aryl carbonate, and subjecting the alkyl aryl carbonate to a disproportionation reaction to obtain a diaryl carbonate, it becomes possible to produce only a diaryl carbonate and water from carbon dioxide and an aromatic hydroxy compound as raw materials, wherein substantially no raw materials other than carbon dioxide and the aromatic hydroxy compound are necessary. Based on this finding, the present invention has been completed." (emphasis added) (see page 15 of the English translation of the first priority document). Thus, it is believed that the Applicants are entitled to June 27, 2003 as their effective filing date in the United States.

Thus, it is believed that the Applicants are entitled to June 27, 2003 as their effective filing date in the United States.

Consequently, WO 03055840 published on July 10, 2003 is not available as a prior art reference against the present case. The Examiner's rejection under 35 U.S.C. 102(a) should be withdrawn.

## **(II) The state of the art and the essential features and advantages of the present invention**

In the outstanding Office Action, the claims are rejected under 35 U.S.C. 103(a) as being obvious over USP 5252771 (see page 2, line 2 from bottom to page 6, line 13 of the Office Action). Before specifically addressing this rejection, it is believed that the following background information should be considered in order to shed a proper light on the development of the present invention and the advantageous features thereof.

As described in the present specification under "Prior Art", there are a number of conventional methods for producing an aromatic carbonate; however, these conventional methods have various problems, such as the use of a toxic substance as a raw material; the corrosion of the production equipment due to a chlorine-containing compound; the cumbersome operation for the removal of a by-product (such as a chlorine-containing compound); and the difficulty in the conversion of a co-product to a raw material. Even when carbon dioxide (which has substantially no toxicity and contains no chlorine compound) is used as a carbonyl source, there still are problems, such as the generations of a co-product and a by-product derived from a

dehydrating agent used, and the need for regeneration or disposal of a dehydrating agent.

In this situation, the present inventors have made extensive and intensive studies. One potential goal was solving the above-mentioned problems accompanying the prior art. As a result, it has been found that potentially all of the problems accompanying the prior art can be solved by a method as defined in claim 1 of the present application. For easy reference, claim 1 of the present application is reproduced below:

1. A method for producing an aromatic carbonate, comprising:
  - (1) performing a reaction between an organometal compound and carbon dioxide to obtain a reaction mixture containing a dialkyl carbonate formed by the reaction,
  - (2) separating said dialkyl carbonate from said reaction mixture to obtain a residual liquid, and
  - performing the following steps (3) and (4) in either order, or partially or wholly simultaneously:
    - (3) reacting said residual liquid with an alcohol to form at least one organometal compound and form water and removing said water from said organometal compound, and
    - (4) reacting said dialkyl carbonate separated in step (2) with an aromatic hydroxy compound to obtain an aromatic carbonate.

As seen from the above-reproduced claim 1, in the method of the present invention, an organometal compound is reacted with carbon dioxide to obtain a reaction mixture containing a dialkyl carbonate (step (1)). The reaction mixture is separated into the dialkyl carbonate and a residual liquid (step (2)), wherein the residual liquid is reacted with an alcohol to form an organometal compound and water (step (3)), and the dialkyl carbonate is reacted with an aromatic hydroxy compound to obtain an aromatic carbonate (step (4)). One feature of the method of the present invention is that an organometal compound is reacted with carbon dioxide in step (1) to obtain a reaction mixture, from which the organometal compound used in step (1) might possibly be regenerated in step (3).

It should be noted that potentially the organometal compound formed in step (3) can be recycled to step (1). It should also be noted that the reaction (i.e., transesterification reaction) performed in step (4) between the dialkyl carbonate and the aromatic hydroxy compound produces an alcohol, which potentially can be recycled to step (3). Therefore, in the method of

the present invention, intermediate products generated during the production of the desired aromatic carbonate can be recycled, and only an aromatic carbonate and water are obtained as products from carbon dioxide and an aromatic hydroxy compound as raw materials, wherein substantially no raw materials other than carbon dioxide and the aromatic hydroxy compound are necessary.

It is important to note that independent claim 1 does not recite any of the recycling steps. Instead, these recycling steps are recited in other claims. For example, the other independent claim, i.e., claim 38, specifically recites the recycling aspect of the present invention.

Thus, the method of the present invention is advantageous not only in that the method does not need the use of any toxic substance and is free from the generation of any corrosive substance, but also in that the amounts of by-products are very small and intermediate products generated during the production of the aromatic carbonate can be recycled, so that the method of the present invention is favorable from the view point of protecting the environment, and enables a simple and efficient production of a high purity aromatic carbonate.

No prior art reference teaches or suggests the method of the present invention and the excellent effects achieved thereby.

### **(III) Rejection of the claims under 35 U.S.C. 103 over USP 5252771**

The Examiner's reasoning for the obviousness rejection over USP 5252771 is summarized as follows:

"The reference **USP 5252771** discloses a dialkyl [sic]\* carbonate prepared from the same components as claimed by applicants except for the type of separation of the water or liquid and the amounts and parameters, i.e., particular stoichiometric amount relative to the amount of the carbon dioxide, as claimed. It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ not only employ [sic]\*\* the various separation techniques as claimed but also the particular amounts and/or parameters as known in the art, since it is well-established that merely selecting proportions and ranges is not patentable absent a showing of criticality." (see page 5, line 5 from bottom to page 6 line 3 of the Office Action)

#### **Note:**

\*) The Applicants note that the Examiner's expression "dialkyl" should correctly

read "diaryl".

\*\*) The Applicants note that the Examiner's expression "employ note only employ" should correctly read "employ not only".

**Traverse is made as follows.**

As explained above with reference to claim 1 of the present application, the method of the present invention for producing an aromatic carbonate comprises steps (1) to (4). In the method of the present invention, an organometal compound is reacted with carbon dioxide to obtain a reaction mixture containing a dialkyl carbonate (step (1)). The reaction mixture is separated into the dialkyl carbonate and a residual liquid (step (2)), wherein the residual liquid is reacted with an alcohol to form an organometal compound and water (step (3)), and the dialkyl carbonate is reacted with an aromatic hydroxy compound to obtain an aromatic carbonate (step (4)). One essential feature of the method of the present invention is that an organometal compound is reacted with carbon dioxide in step (1) to obtain a reaction mixture. The organometal compound as used in step (1) may be regenerated in step (3). The organometal compound formed in step (3) can potentially be recycled to step (1).

On the other hand, USP 5252771 is directed to a method for producing a diaryl carbonate, which comprises contacting an aromatic hydroxy compound and a carbonyl halide or aryl haloformate in the presence of a catalyst comprising aluminum trifluoride (which is an organometal compound) (see ABSTRACT and claim 1 of USP 5252771). USP 5252771 also refers to the use of carbonic dioxide (see column 3, line 46 of USP 5252771). Therefore, an organometal compound, carbon dioxide and an aromatic hydroxy compound, which are used in the present invention, are also disclosed in USP 5252771, as the Examiner points out.

However, in the present invention, an organometal compound, carbon dioxide and an aromatic hydroxy compound are used in a manner very different from the manner in which these compounds are used in USP 5252771.

Specifically, in step (1) of the method of the present invention, an organometal compound is reacted with carbon dioxide to obtain a reaction mixture. Potentially, this organometal compound may be regenerated in step (3). On the other hand, in the method of USP 5252771, there is no reaction between an organometal compound and carbon dioxide. In the method of USP 5252771, the organometal compound is not used as a reagent to be reacted with carbon dioxide. To the contrary, the organometal compound is used as a catalyst (see claim 1 of USP 5252771). In the method of USP 5252771, carbon dioxide is not used as a reagent to be reacted with an organometal compound. It is used as an inert gas. The fact that USP 5252771

uses carbon dioxide as an inert gas is apparent from the following description of USP 5252771:

“Desirable inert gases for use in the process of this invention are nitrogen, carbon dioxide, and hydrocarbons, such as gaseous toluene.” (emphasis added) (see column 3, lines 44-47 of USP 5252771)

In connection with the use of an organometal compound, it should be noted that USP 5252771 does not teach or suggest the generation of an organometal compound in step (3) of the method of the present invention.

Further, in step (4) of the method of the present invention, an aromatic hydroxy compound is reacted with a dialkyl carbonate. On the other hand, in the method of USP 5252771, there is no reaction between an aromatic hydroxy compound and a dialkyl carbonate. In the method of USP 5252771, an aromatic hydroxy compound is not reacted with a dialkyl carbonate, but with a carbonyl halide or aryl haloformate (see claim 1 of USP 5252771).

As seen from the above, it is apparent that the present invention is different from USP 5252771 in how to use an organometal compound, carbon dioxide and an aromatic hydroxy compound. The use of these compounds in the presently claimed manner is not taught or suggested by USP 5252771. Especially, the use of an organometal compound as a reagent in the method of the present invention is not taught or suggested by USP 5252771. Therefore, the method of the present invention is never taught or suggested by USP 5252771.

Also, as explained above, the method of the present invention is advantageous not only in that the method may not require the use of any toxic substance and may be free from the generation of any corrosive substance, but also in that the amounts of by-products may be very small and intermediate products generated during the production of the aromatic carbonate may potentially be recycled, so that the method is favorable from the view point of protecting the environment, and simple and efficient production of a high purity aromatic carbonate. Such excellent effects of the method of the present invention are not taught or suggested by USP 5252771.

Therefore, it is apparent that USP 5252771 does not have any teaching or suggestion about the essential features of the method of the present invention and the effects achieved thereby. Thus, the rejection of the claims over USP 5252771 should be withdrawn.

**(IV) Conclusion**

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

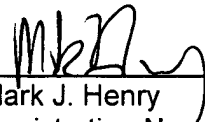
Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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Date: Dec 23 2008

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